63d Congress, 2d Session. } HOUSE OF REPRESENTATIVES. { Document No. 514.

OKLAWAHA RIVER, FLA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF OKLAWAHA RIVER TO LAKE DORA, FLA.

January 12, 1914.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, January 8, 1914.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 7th instant, together with copies of reports from Maj. J. R. Slattery, Corps of Engineers, dated December 29, 1911, and January 21, 1913, with map, on preliminary examination and survey, respectively, of Oklawaha River to Lake Dora, Fla., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

Lindley M. Garrison,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 7, 1914.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Oklawaha River to Lake Dora, Fla.

1. There are submitted herewith, for transmission to Congress, eports dated December 29, 1911, and January 21, 1913, with map, y Maj. J. R. Slattery, Corps of Engineers, on preliminary examinaion and survey, respectively, of Oklawaha River to Lake Dora, Fla., uthorized by the river and harbor act approved June 25, 1910.

2. The Oklawaha River has its source in numerous lakes in the central part of the peninsula of Florida and empties into the St. Johns River about 20 miles above Palatka. The existing project for its improvement provides for securing a channel 6 feet deep from the mouth of the river to the head of Silver Springs Run by dredging and removal of obstructions; a channel 4 feet deep from the mouth of Silver Springs Run to Leesburg by removal of obstructions; and to maintain the levels of the lake at the head of the river. The depths proposed have not been attained. The commerce of the stream now amounts to about 100,000 tons per annum.

3. The district officer is of opinion that a material development of this country would follow the construction of a reliable waterway from Lake Dora to the mouth of the river, and that a saving of about $600,000 annually would be effected thereby. Plans and estimates of cost are submitted by him for a 6-foot channel, 60 feet wide, from the mouth of the river to Mount Dora; a 4-foot channel, 50 feet wide, from the mouth to Mount Dora; and for a 6-foot channel from the mouth to Silver Springs Run and thence a 4-foot channel to Mount Dora. All plans contemplate improving the river from its mouth to the lower end of the Kyle Young Canal by dredging, easing bends, and constructing such cut-off dams as are essential, and by canalization above this point. He is of opinion that the river is worthy of improvement to the extent of providing a 6-foot channel from its mouth to Mount Dora under certain conditions of local cooperation, at an estimated cost of $616,000. The division engineer concurs in general with the favorable opinion of the district officer.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its accompanying report, dated December 3, 1913. In connection with its consideration of the subject, the board visited the locality on April 13, 1913, held a public hearing near Leesburg, and made a personal inspection of the stream. The board is in general accord with the views of the district officer and the division engineer regarding the advisability of the proposed improvement, but it believes that the lock chamber dimensions proposed should be increased from 30 feet wide by 125 feet long to 36 feet wide by 160 feet usable length. The estimated cost of the project, as thus modified, is $733,000 and $12,000 per annum for maintenance. The board expresses the opinion that the present and prospective commerce is sufficient to justify the United States in undertaking this improvement—

> *Provided*, That any land necessary for the construction of the waterway shall be given to the United States without charge; that interested property owners shall agree to protect the United States against claims for damages on account of any land that may be flooded; that local interests give satisfactory assurance that they will provide for the use of the public suitable wharf and terminal facilities in the vicinity of Leesburg; and that they will establish and operate a boat line over this waterway which will be competitive with the railroads and not subject to control or purchase by railroad and other corporate interests.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore report that the improvement by the United States of Oklawaha River from its mouth to Lake Dora is deemed advisable to the extent of obtaining a channel 6 feet deep and 60 feet wide, in the manner

contemplated by the district officer, and with locks of dimensions as proposed by the Board of Engineers for Rivers and Harbors, at an estimated cost of $733,000 for original construction and $12,000 per annum for maintenance, subject to the conditions of local cooperation recommended by the board and quoted above. The first appropriation should be $175,000, with subsequent appropriations sufficient to omplete the work in four years.

6. While this project was under consideration, it was stated by nterested parties that a plan of improvement might be devised which would drain and make available for cultivation large areas of land in ddition to giving navigation facilities. This phase of the subject was investigated and the conclusion was arrived at that the additional cost of any plan, which would coordinate land drainage and eclamation with a navigation project, was greater than was waranted by the amount of land which would be beneficially affected. hould the owners of the land to be benefited, however, be willing to ontribute any additional sum that a project providing for the reclamation and drainage of the land would cost over the project which rovides for navigation alone, such project should preferably be dopted; and it is therefore recommended that the Secretary of War be given authority to make such modifications of the project bove recommended for adoption as may be approved by the Chief f Engineers and as may be necessary to provide for land drainage nd reclamation, as well as for navigation, provided that no work of onstruction shall be undertaken on such modified project until local nterests shall have deposited with the Secretary of War an amount equal to the estimated cost of such modification of the project.

EDW. BURR,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 3, 1913.

o the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The survey develops the fact that above Silver Springs Run the ow-water discharge of the Oklawaha River is about 124 cubic feet per econd. The district officer states this will not maintain a channel feet deep and 60 feet wide by regulation, and that it is only sufficient or a channel 3 feet deep and 30 feet wide. The conclusion is reached, herefore, that if the river is to be improved above Silver Springs Run, t must be by canalization. The discharge of the river below Silver prings Run was determined to be about 800 cubic feet per second, hich the district officer states is sufficient to secure a channel 6 feet eep and 60 feet wide by regulation.

2. Plans and estimates are presented for a 6-foot channel, 60 feet ide, from the mouth of the river to Mount Dora, for a channel etween the same points 4 feet deep and 50 feet wide, and for a hannel 6 feet deep from the mouth of the river to Silver Springs Run

and 4 feet deep thence to Mount Dora, the estimates being, respectively, $616,000 and $12,000 per year for maintenance, $399,000 and $10,000 for maintenance, and $438,000 and $10,000 for maintenance All plans contemplate improvement by open channel methods up to the lower end of the Kyle & Young Canal, a lock and dam at the lower end of the canal and at Moss Bluff, and a lock at Leesburg, and dredging in the upper end of the pools.

3. Two routes are considered to reach Lakes Eustis and Dora—one by way of Haines Creek and the Lake Dora Canal and the other by way of a canal connecting Lakes Griffin and Harris, Dead River, and Lake Dora Canal. The former route would require a lock and dam, while the second would require a lock without a dam. The latter would be the more economical route, and, for reasons given, is selected. The dimensions proposed for the lock chambers are 30 feet by 125 feet. The plan of improvement involves the making of 27 cut-offs.

4. The district officer states that the towns in the vicinity of the lakes have a commerce amounting to about 110,000 tons, none of which is now shipped by water. Ocala has a commerce amounting to about 300,000 tons, of which practically none is now handled by water. The district officer believes that a conservative estimate of the saving that would result from the improvement on a basis of 200,000 tons of commerce would be about $600,000 annually. He believes that the river is worthy of improvement under certain conditions named to the extent of providing a 6-foot channel, at an estimated cost of $616,000 and $12,000 annually for maintenance. The division engineer concurs generally in the views of the district officer and reports the locality as worthy of improvement by the United States.

5. The board was not convinced by the data presented that the United States would be justified in undertaking this improvement at the cost involved, and interested parties were so informed and given an opportunity of presenting their views. A number of communications were received and given consideration by the board, and in connection with this subject an inspection of the locality was made and a public hearing held in the vicinity of Leesburg, Fla., on April 13, 1913.

6. It was stated by one of the interested parties that a modified plan of improvement might be devised which would afford navigation and at the same time drain and make available for cultivation large areas of land similar to that now under improvement by Kyle & Young. At the request of the board the district officer made an investigation of this phase of the subject and submitted a report under date of May 17, 1913, from which it appears that a plan which will coordinate drainage and reclamation with navigation would cost from $31,350 to $251,900 more than the plan outlined by him, depending upon the location of the works and the dimensions of the channel to be secured. His investigations along this line lead him to the conclusion that it is not practicable to coordinate the drainage of lands with the improvement of the river so as to lessen the cost of such improvement and compensate the Government for expenditures made in the interests of navigation.

7. The lock-chamber dimensions proposed by the district officer, as stated above, were 30 feet by 125 feet. Believing that these dimensions were too small to provide for the commerce that might be

expected to develop on this waterway in the future, and that the estimates in some respects were inadequate, the board secured additional data from the district officer, and a revised estimate has been made for the 6-foot waterway from the mouth of the Oklawaha to Mount Dora, with locks 36 feet by 160 feet. The modified estimate s $733,000, as against $616,000 submitted, in the original report.

8. There seems to be a very general demand for this improvement and a firm belief that it would result in a very marked development hroughout the adjacent country and create a commerce of consid-rable magnitude. There is a large section of very rich and fertile ountry tributary to this waterway and to the lakes at its head, which is being converted into orange groves and truck farms. It s stated that under present conditions business is hampered by high ransportation charges and by congestion in rail freights during the usy season, and that relief can be obtained only by a competitive waterway.

9. It is believed that the present and prospective commerce is ufficient to warrant the United States in undertaking this improvement along the lines proposed by the district officer, at a total estimated cost of $733,000 and $12,000 annually for maintenance, pro-ided that any land necessary for the construction of the waterway hall be given to the United States without charge; that interested roperty owners shall agree to protect the United States against aims for damages on account of any land that may be flooded; hat local interests give satisfactory assurance that they will provide or the use of the public suitable wharf and terminal facilities in the icinity of Leesburg; and that they will establish and operate a boat ne over this waterway which will be competitive with the railroads nd not subject to control or purchase by railroad and other corporate terests. Precise locations and details in general should be subject o modification from time to time as the work progresses, with the approval of the Chief of Engineers. The first appropriation should be 175,000, and subsequent appropriations so made as to complete the work within a period of four years.

10. In compliance with law, the board reports that except as con-emplated by the above recommendations, there are no questions of erminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen he cost and compensate the Government for expenditures made in he interests of navigation.

For the board:

Lansing H. Beach,
Colonel, Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF OKLAWAHA RIVER, FLA.

United States Engineer Office,
Jacksonville, Fla., December 29, 1911.

Sir: I have the honor to submit the following report on a prelim-nary examination of the Oklawaha River to Lake Dora, Fla., provided for in the river and harbor act approved June 25, 1910.

The detailed examination was made by Mr. J. W. Sackett, chief sistant engineer, from whose report the following description of he locality is quoted.

The Oklawaha River has its source in numerous lakes in the central part of th Peninsula of Florida. The extreme head of this waterway may be considered i Lake Apopka, 130 miles above the mouth, from which lake the water finds its wa northerly through a marsh, and a channel, partially artificial, to Lake Beauclai which lies adjacent to and is connected with Lake Dora. The waters from Lake Dor find their way into Lake Eustis northwesterly through a swampy depression, throug which local enterprise, about 30 years ago, excavated a channel to enable boats t pass from one lake to the other, a distance of about three-fourths mile. Lake Eusti empties into Lake Griffin through a stream about 7 miles long, flowing in a north westerly direction from the westerly side of the lake. This stream, while a part of th Oklawaha River, is locally known as Haines Creek. Lake Harris, formerly calle Lake Astatula, lies southwest of Lake Eustis and south of Lake Griffin. This lak empties into Lake Eustis northeasterly, through a good waterway about 1½ miles long known as Dead River. Lake Griffin is the lowermost of the series of lakes which for the headwaters of the Oklawaha River.

This group of lakes afford a remarkable system of intercommunication throughou a region of unusual productiveness, both horticulturally and agriculturally. Ampl depth extending close to shore is found in all of these lakes. The shore lines of th lakes mentioned, excepting Lake Apopka, which is by far the largest lake, but is no included within the scope of this examination, aggregate in length 112 miles, no including the communicating waterways.

From the north end of Lake Griffin the river flows in a general northwesterly directio through marshy land and prairie for a distance of about 28 miles. At this point th cypress swamp begins, through which the river flows throughout the rest of its cours Silver Springs Run enters the river from the west about 33 miles below Lake Griffi This stream is about 5½ miles long and is the outlet to a very large spring or cluster springs. The run in its natural condition affords easy navigation for all boats able t ply the lower Oklawaha. From Silver Springs Run the river flows in a general north easterly direction for about 15 miles, thence in a northerly direction for about 18 mile to Fort Brooks. At this point the river makes an abrupt turn aud flowing in an easterl direction, a distance of 20 miles, it empties into the St. Johns River at a point 22 mile above Palatka, or 77 miles above Jacksonville.

Most of the land on the bank of the lakes is susceptible to cultivation, and th adjacent land is high and rolling and favorably situated for orange groves, truck farm and picturesque building sites. The citizens are enterprising and enthusiastic i regard to the development of the locality. Many miles of hard-surfaced road hav been constructed and the citizens of Leesburg authorized the bonding of the town fo the construction of a canal through the town to connect Lakes Harris and Griffi between which the town lies, and the limits of which extend from lake to lake. length of 2,350 feet of this canal has been excavated from Lake Griffin and 2,140 fee from Lake Harris, leaving 3,400 feet still to be excavated, which includes a new alig ment of a portion of the canal from Lake Harris. The right of way for this canal an wharfage space at the basins, I am informed, has been acquired by the municipality

Previous preliminary examinations were made of this river in 188 and 1905 and surveys in 1891 and 1906. The reports on these exam inations and surveys may be found as follows: Preliminary examina tion, Annual Report Chief of Engineers, 1889, pages 1360–1364 survey, Annual Report Chief of Engineers, 1891, pages 1620–1627 preliminary examination 1905, and survey, 1906, House Documen No. 782, Fifty-ninth Congress, first session.

In 1891 a project for the improvement of this river was adopted providing for clearing the river of obstructions so as give a navigabl channel 4 feet deep at mean low water from the mouth to Leesburg a distance of 94 miles, at an estimated cost of $26,000. This wa modified by the river and harbor act of March 2, 1907, which provide for removing obstructions and deepening the channel to 6 feet a mean low water from the mouth of the river to the head of Silve Springs Run at an additional estimated cost of $15,000.

The river and harbor act of June 25, 1910, appropriated $20,710 fo continuing this improvement, and provided that so much of said sum together with any funds previously appropriated and then remainin the credit of said project as might be necessary for that purpose might be used for the maintenance of levels in the lakes at the hea of the river, especially Lake Griffin. Of the amount appropriated, the sum of $5,000 was allotted for maintenance. The total expenditure on this improvement has been $47,516.36, of which $24,914.07 was for work of maintenance.

There is at present a well-cleared channel 6 feet deep for 32 miles above the mouth of the stream, and thence a practical channel 4 feet deep at ordinary low stages of the river to Silver Springs Run, and thence a channel 3 feet deep at ordinary stages of water to Leesburg, which is 94 miles above the mouth.

A board of Engineer officers was appointed April 5, 1911, to consider and make recommendations concerning the improvement and the preservation of the navigability of this stream. The board submitted its report under date of April 27, 1911. It recommended that a cut-off about 4 miles long made by private enterprise for the purpose of reclaiming land between Moss Bluff and a point about 10 miles above Silver Springs Run be legalized and that the available funds be expended in the construction of a lock and dam to insure that the water level above this cut-off might not be lowered. The board was of the opinion that, under several conditions to guard the interests of the United States, the cut-off under control of a lock would be of material advantage to navigation interests. The board further recommended that, should the funds available suffice, a bar in the river just above Sharps Ferry and below the canal be removed, the bends in the river above the dam be eased, and such other minor obstructions as may exist in the river upward to Lake Griffin be removed to an extent which will not endanger the lake levels at the source of the stream. On June 15, 1911, the Chief of Engineers authorized the preparation of plans and specifications for the lock and procedure with the work recommended by the board, under the restrictions necessary to properly guard the interests of the United States. The plans and specifications for the lock were forwarded to the Chief of Engineers for approval September 19, 1911. Further progress in this work is now awaiting the acquirement of title to the site of the proposed lock.

The following history of transportation in this locality is taken from Mr. Sackett's report:

> In 1860 a line of steamers was established between Jacksonville and Leesburg on Lake Griffin and into Lakes Eustis and Harris (then called Lake Astatula), and during high stages of the water these steamers are said to have gone to Okahumka. This line of steamers is said to have done a flourishing business and was the means of rapidly developing the agricultural resources of the region thus made accessible. In 1874 a competing line of steamers was put on the same run, and both are said to have done a good business until 1883, when an unusually low stage of the water occurred, which seriously interfered with the traffic. About this time a railroad was built from Astor, on the St. Johns River, to Fort Mason, on Lake Eustis, a distance of about 25 miles. At this time water transportation on the St. Johns River was provided for by a large number of fine river steamers. By means of the above-mentioned railroad the lake region at the head of the Oklawaha River was afforded rapid and ready access to market at reasonable rates. This section of the State being peculiarly well adapted to he growth of citrus fruits, the development of a large number of orange groves rapidly took place and the region was, in a few years, traversed in almost every direction by several lines of railroads, and a number of thriving towns were established. These ailroads have since been combined and form parts of the two general systems, the Atlantic Coast Line and the Seaboard Air Line Railways.
>
> The railroad from Astor to Fort Mason was eventually absorbed by one of the larger ystems. In the meanwhile logging operations began on the Oklawaha River which aused so many obstructions that navigation became very difficult. Lack of use ggravated the conditions, and floating islands so obstructed the river between Lake Griffin and a point about 5 miles below the lake that navigation even for small boats

became very difficult. The railroads then obtained control of the traffic, which had previously been tributary to the lake region at the head of the river, and have retained it ever since, establishing freight rates that have seriously handicapped further development of this section as compared with other sections more favorably situated as to means of transportation. Sanford is on the St. Johns River and at about the same distance from Jacksonville as Leesburg. The existing freight rates per hundred pounds between the two places and Jacksonville are as follows:

Class.	Leesburg.	Sanford.	Class.	Leesburg.	Sanford.
	Cents.	*Cents.*		*Cents.*	*Cents.*
First	68	37	Fourth	45	24
Second	62	32	Fifth	38	19
Third	57	29	Sixth	33	16

Thus it will be seen that the freight rates on all classes from Leesburg averages nearly twice the rate from Sanford.

I am informed that during the time the Oklawaha steamers ran to Leesburg the rate on a box of oranges from Leesburg to Jacksonville was 10 cents. Shipments from the large orange groves at Emeralda, situated on the river and on Lake Griffin, where the river leaves the lake, are now required to be made across the lake on a boat owned by the railroad and delivered at the terminal owned by the railroad at Leesburg. The rate from Emeralda to Leesburg is 9 cents per box, and the rate from Leesburg to Jacksonville is 17 cents, a total of 26 cents, as against the rate of 10 cents formerly enjoyed. There is said to be 100,000 boxes of oranges and vegetables shipped from Emeralda annually. This represents a very considerable burden upon the shippers of this locality. It is said to frequently happen that during the rush of the shipping season the railroads can not or do not supply sufficient cars to care for the shipments offered, and much delay and often considerable loss is occasioned thereby.

Commercial statistics.—The commerce of the towns in the lake region during the past year was as follows:

Towns:	Tonnage.
Leesburg	32, 364. 5
Eustis	24, 000
Mount Dora	4, 043
Tavares	43, 803
Tangerine	3, 300
Lisbon	1, 578
Total tonnage per annum	109, 088. 5

All of this commerce was handled by rail. The water-borne commerce of the lower river for the calendar year 1910 amounted to 99,181 tons.

Kaolin is found in numerous places throughout the lake region, but is mined at present only at Richmond, near the south shore of Lake Harris. The output of the works at this place during the past six months is said by the superintendent of the works to have been 35 cars per day. This has recently been increased to 40 cars per day. All of this was shipped to northern ports by rail. Cheaper transportation such as would be afforded by water, would greatly stimulate this industry. The high freight rates are claimed to make the margin of profit very small at present.

Large tracts of land capable of high development agriculturally lie along the river between Lake Griffin and Silver Springs Run, now entirely uncultivated, owing to lack of means of transportation. The operations by private enterprise now in progress below Moss Bluff, previously referred to, with which the Government is to cooperate by the construction of a lock, is expected to reclaim 4,200 acres of extremely fertile land. This land is already being planted.

A study of the railway maps of the State of Florida shows that the railway lines are some distance away from the river. Points on the railway are generally reached only by heavy sand roads. An improved river channel would therefore probably result in a much greater development along the banks of this river than has heretofore taken place, and a considerable river commerce might result.

The route favored for the Trans-Florida Canal would have provided the needed transportation facilities for this locality. The board's recommendation on this proposed canal was unfavorable. A smaller channel than that considered by the board on the Trans-Florida Canal would meet the needs and wishes of the country along the Oklawaha. The general opinion seems to be that a channel 6 feet deep and 100 feet wide would be sufficient.

I am of the opinion that a material development of this country would follow the construction of a reliable waterway from Lake Dora to the mouth of the river, suitable connecting waterways being provided to points on the shores of the lakes at the headwaters; that the improvement of the river is worthy of being undertaken by the United States, notwithstanding the fact that the cost will be great, compared with the commerce that will be benefited at the present time and for some years hence; that three plans of improvement should be considered: First, the improvement of the river by regulation; second, regularization of river up to Silver Springs and canalization above; and, third, a lateral canal along the route recommended for the Trans-Florida Canal, all plans contemplating securing a channel 6 feet deep and 100 feet wide. Most of the data needed for a study of this matter was obtained by surveys made under the Trans-Florida Canal Board. These surveys did not, however, include a survey of the river proper, and did not fully cover the lake region. The survey should therefore be supplemented to this extent. It is therefore recommended that a survey of this river be authorized. It is estimated that the cost of a survey and the preparation of plans and estimates would be $5,000.

The canals at Leesburg will provide public terminals under the control of the municipal authorities, and it is stated by those interested in the improvement that similar facilities will be provided at other points.

Along the banks of the river there is much marsh land, which would be highly productive if reclaimed. It may be possible to coordinate the reclamation of this land with the improvement of the river in the nterest of navigation. If canalization should prove to be the best method of improvement as a result of further study of this matter, some water power could be developed at dam sites. The extent to which this would be possible and profitable can only be determined after definite plans have been decided upon and the water power situation carefully considered.

A letter from a committee of the Board of Trade of Leesburg, and a etter of a committee of a meeting of citizens at Tavares, accompanied by a letter from Mr. John H. Donnelly, mayor of Mount Dora, setting orth the needs of the various localities and giving commercial statisics are submitted herewith.

Very respectfully,

J. R. SLATTERY,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF THE DIVISION ENGINEER,
SOUTHEAST DIVISION,
Savannah, Ga., January 1, 1912.

1. Respectfully forwarded to the Chief of Engineers, United States Army.

2. I agree with the district officer that this river is worthy of a survey, and I would recommend the allotment of $5,000 for the purpose of a survey and study along the lines suggested by the district officer in paragraph 20 of his report.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, April 2, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This river has been under improvement since 1891, when a project was adopted for clearing the river of obstructions so as to give a 4-foot channel depth at mean low water from the mouth to Leesburg, a distance of 94 miles. This project was modified in 1907 by providing for a channel 6 feet deep at mean low water from the mouth of the river to the head of Silver Springs Run. The total expenditures have been $47,516.36, about one-half having been used for maintenance. It is reported that at present there is a clear channel 6 feet deep for 32 miles above the mouth, and thence a practicable channel 4 feet deep at ordinary low stages to Silver Springs Run, 62 miles above the mouth, and thence a channel 3 feet at ordinary stages to Leesburg.

3. Leesburg is situated near the head of Lake Griffin, which is the largest of several lakes forming the headwaters of Oklawaha River, Lake Dora being one of them. The lakes are generally of navigable depth, and are more or less connected by natural or artificial channels. The territory immediately adjacent lies fairly high and is reported to be susceptible of cultivation. There is a total commerce in this lake region reported to amount to about 100,000 tons, all handled by rail. Except perhaps for a small amount of local commerce, there is none by water in the upper section of the river, but on the lower river it is reported as amounting to nearly 100,000 tons, about 80,000 tons of which consists of logs. The lake section is being rapidly developed, and the residents are apparently deeply interested in securing better navigation facilities.

4. The district officer is of opinion that a reliable waterway from Lake Dora to the mouth of the river would be of material advantage in the further development of this section, and although anticipating that the cost will be high as compared with the existing and immediately prospective commerce, he believes the waterway is worthy of improvement, and recommends a survey with the preparation of three plans of improvement: First, by regulation; second, regulation and canalization; and third, a lateral canal along the route suggested in the report on the Trans-Florida Canal, all plans to have in view a channel 6 feet deep and 100 feet wide. He estimates that the survey

and preparation of plans will cost about $5,000. The division engineer concurs in the views of the district officer.

5. While it appears very questionable whether an adequate improvement can be made at a reasonable cost, the board believes that a survey is necessary in order to determine these elements upon which the advisability depends, and it therefore recommends that the survey be authorized and that estimates be made for depths of 4 and 6 feet, respectively, with discussion of the relative advantages of each.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

War Department,
Office of the Chief of Engineers,
Washington, April 13, 1912.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Oklawaha River to Lake Dora, Fla., authorized by the river and harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. Bixby,
Chief of Engineers, United States Army.

[Fifth indorsement.]

War Department, *April 15,1912.*

Approved:

Robert Shaw Oliver,
Assistant Secretary of War.

SURVEY OF OKLAWAHA RIVER, FLA.

War Department,
United States Engineer Office,
Jacksonville, Fla., January 21, 1913.

From: Capt. J. R. Slattery, Corps of Engineers,
To: The Chief of Engineers, United States Army
(Through the division engineer).
Subject: Survey of Oklawaha River to Lake Dora, Fla.

1. In compliance with department letter dated April 19, 1912, I submit the following report on survey of Oklawaha River to Lake Dora, Fla.

2. The survey of the river was made by a party in charge of Mr. J. G. Coxetter, inspector. The party left Jacksonville June 7, 1912, and proceeded to Lake Eustis, establishing en route gauges at Welaka, Cedar Landing, Fort Brook Landing, Jordans Landing, Tobacco Patch Landing, Eureka, Conner, Sharpes Ferry, Heather Island Ferry, Forts Landing, Moss Bluff, Pendarvis Ferry, Pine Bluff, Starkes

Ferry, Emeralda, heads of canals leading from Lakes Griffin and Harris and Leesburg, Lisbon, upper and lower ends of Lake Dora Canal, and upper and lower ends of Dead River. All gauges were set from bench marks established in connection with the Trans-Florida Canal surveys. The gauges at Jordans Landing, Sharpes Ferry, and Moss Bluff were read every half hour from 6 a. m. to 6 p. m. during the progress of the survey.

3. Lakes Dora, Eustis, Griffin, and Harris were surveyed in connection with the Trans-Florida Canal, but the streams connecting them were not.

4. Stadia traverses were, therefore, run along Lake Dora Canal and Haines Creek, and soundings taken on cross sections tied to their traverses and located about 140 feet apart on Lake Dora Canal, and about 225 feet apart on Haines Creek, and a line of soundings was run down the center of each stream. Borings were taken to a depth of 12 feet about 450 feet apart on Lake Dora Canal and about 810 feet apart on Haines Creek. Stadia traverses were also run along the canals from Lakes Griffin and Harris to Leesburg. Cross sections located from these traverses were made about 250 feet apart and a line of soundings was taken down the center of the canal. Borings were taken to 12 feet about 250 feet apart.

5. Dead River and the portion of the Oklawaha River between Lake Griffin and Pendarvis Ferry were covered by a simple triangulation system and soundings located by intersections from stations thus established. Where the width of the river permitted, soundings were taken in lines across the river. Where the river was narrow, cross sections were taken about 300 feet apart and a line of soundings was run along the center line of the river. Borings were taken about 1,350 feet apart to a depth of 12 feet.

6. A stadia traverse was run along the Oklawaha from Pendarvis Ferry to Tobacco Patch Landing, and cross sections, located from this traverse, were taken about 250 feet apart. A line of soundings was also taken along the center of the river. Borings were taken 820 feet apart. From Tobacco Patch Landing to the mouth of the river, a reconnaissance was made. Cross sections located by this reconnaissance were taken about 750 feet apart and a line of soundings was made along the center of the river. Borings to a depth of 12 feet were taken about 900 feet apart. In making this reconnaissance a map of the river prepared in 1891 was followed by the survey party. Whenever the course of the river was found to be incorrectly shown by this map, a stadia survey was made of the incorrect portions and the map corrected accordingly. The soundings given by the old map were not used. New soundings were taken. Surface current observations were made near Lisbon in Haines Creek, at Pendarvis Ferry, in Kyle & Young Canal, at Conner, Sunday Bluff, and in Silver Springs Run about a mile from its mouth.

7. The swampy character of the country through which the Oklawaha flows and the high stage of the river, necessitated building many stations and added greatly to the expense and time consumed in the execution of the work. Heavy and frequent rains also further delayed the work. The field work was completed September 26, 1912.

8. As determined by current observations, the low-water discharge of the Oklawaha River about the point where Silver Springs Run empties into it, is about 124 cubic feet per second, about one-fifth of the discharge necessary in order to maintain a channel 6 feet deep and 60 feet wide by regularization, and about the discharge necessary to maintain a channel 3 feet deep and 30 feet wide. A channel of such dimensions as this is not considered suitable for purposes of navigation, and, therefore, if the river is to be improved above Silver Springs Run, canalization must be resorted to.

9. The discharge of Silver Springs Run was determined to be 800 cubic feet per second and the discharge of the Oklawaha River below the mouth of this run, about 800 cubic feet per second. Some water from the river being wasted by cut-offs from the river in the swamp. The discharge is sufficient to permit a channel 6 feet deep and 60 feet wide, being secured by regularization, from the mouth of Silver Springs Run to the mouth of the river.

10. Plans and estimates are, therefore, submitted:

For a 6-foot channel 60 feet wide from mouth of river to Mount Dora.

For a 4-foot channel 50 feet wide from mouth of river to Mount Dora.

For a 6-foot channel from mouth of river to Silver Springs Run, and a 4-foot channel from Silver Springs Run to Mount Dora.

These plans all contemplate improving the river from its mouth to the lower end of the Kyle & Young Canal by dredging, easing bends, and constructing such cut-off dams as are essential. All plans provide for a lock and dam at the lower end of Kyle & Young Canal, another lock and dam at Moss Bluff, and a lock at Leesburg. All plans contemplate dredging from the mouth of Silver Springs Run to Lock No. 1 (at the lower end of Kyle & Young Canal), so as to create a pool in this section with the surface at elevation 37.5, the level of the water surface at the mouth of Silver Springs Run at low-water stage. This arrangement is resorted to because there is no place near Silver Springs Run where a lock and dam could be constructed except at great cost, and, second, because it would facilitate the drainage of about 200 acres of land at the upper end of the pool. In all the plans, Lock and Dam No. 1 raises the surface of the upper pool to elevation 45, which is 4 feet above the present level of the water surface at this point. This is as high as the surface of the pool can be raised without flooding the large area of land recently drained by Kyle & Young, and on the other hand, this is just about at present surface of high water at the lower end of this stretch, so there will be no land flooded at high water that is not now flooded. Considerable dredging will be necessary in the upper end of this pool in order to provide the necessary depth. The proposed lock would be of concrete with wooden miter gates. The dam would be an earthern embankment. A concrete spillway is contemplated, composed of piers with vertical lift gates closing the opening between the piers; the gates to be operated from a reinforced concrete platform bridging the piers.

The spillway would provide a discharge equal to or slightly greater than the present high-water cross section of the Kyle & Young Canal.

11. The lock and dam at Moss Bluff (Lock and Dam No. 2) would raise the surface of the upper pool to elevation 56, the low-water eleva-

tion of Lake Griffin. With the pool at this level, no land would be flooded except such as is already flooded during high water. As in the case of the next pool below, dredging would be necessary in the upper portion of the pool in order to obtain the required depths. Lock and Dam No. 2 would be similar in all respects to Lock and Dam No. 1, the spillway being given sufficient area as determined from the flooded cross section of the river where it is contracted at Moss Bluff to discharge flood discharges, when all gates of the spillway are opened, without raising the water surface above the elevation it now reaches during flood stages.

12. To reach towns in Lake Eustis and Dora, two routes suggest themselves. One by way of Haines Creek and the Lake Dora Canal, and the other by way of a canal connecting Lakes Griffin and Harris, Lake Harris, Dead River, and Lake Dora Canal. If the former route were selected for improvement, a lock and dam would be neessary in order to put Haines Creek into any sort of shape for navigation. If the second route were selected, a lock would be necessary in the canal between Lakes Griffin and Harris (no dam would, however, be necessary), the canal, partly constructed by local interests, would have to be enlarged and completed, a very small amount of work would have to be done on Dead River, and the Dora Canal would have to be deepened and widened. The latter route would cost considerably less than the former, and is selected not only because of its lower cost, but also because it follows the line recommended for the Trans-Florida Canal and would lend itself better to the construction of such a canal than would a route by way of Haines Creek, Lake Eustis, and Dead River and Lake Griffin, and because Leesburg is by far the most important point in the lake region, and the shortest possible route to it should, therefore, be provided.

13. There are no places on the river where rock foundation could be had for locks, and all locks and spillways will have to be built on piles. At the site proposed for Lock and Dam No. 1, sticky clay is encountered at from 4 to 8 feet and hard clay at 8 feet below low water. This information was obtained by borings taken with a pointed iron rod. At Moss Bluff sand is encountered at from 2½ to 4 feet below low water. Below the sand is a hard clay which borings taken to a depth of 40 feet did not penetrate. These borings were driven pipe wash borings. Samples were also obtained by means of an auger. In the Leesburg Canal hard clay is encountered to great depths. The information was secured by borings taken with a pointed iron rod.

14. The dimensions proposed for the lock chambers are 30 feet by 125 feet. Drawings for the proposed locks and dams have not been prepared, because it was not considered advisable to go to this expense in view of the grave uncertainty as to whether this project will be considered worthy of being undertaken by the United States, although so regarded by the undersigned. Details were worked out only far enough to enable a reasonably accurate estimate of the cost of the locks and dams to be made.

15. The three estimates are as follows:

Six-foot channel, 60 feet wide, from mouth of Oklawaha River to Mount Dora.

Mouth of river to lower end of Kyle & Young Canal:		
Clearing reach of snags and hyacinths		$20, 000
Dredging 866,000 cubic yards of material in easing bends, making cut-offs, and removing shoals, at 15 cents		129, 900
Lock and Dam No. 1:		
Dam—		
Concrete, 1,000 cubic yards, at $10	$10, 000	
Piling, 4,000 linear feet, at 40 cents	1, 600	
Bridge	200	
Gates	800	
Cribwork and stone, 150 cubic yards, at $5	750	
Excavation, 1,600 cubic yards, at 50 cents	800	
Earth-fill dam, 5,000 cubic yards, at 20 cents	1, 000	
		15, 150
Lock—		
Cofferdam, 500 linear feet, at $20	10, 000	
Earth excavation, 5,000 cubic yards, at 50 cents	2, 500	
Piling, 5,000 linear feet, at 40 cents	2, 000	
Concrete, 1,500 cubic yards, at $10	15, 000	
Gates	800	
Valve-maneuvering appliances, bolts, etc	800	
Flooring and miter sills, 40 M, at $40	1, 600	
		32, 700
Upper and lower guide walls—		
Excavation, 1,000 cubic yards, at 50 cents	500	
Piling, 1,500 linear feet, at 40 cents	600	
Concrete, 100 cubic yards, at $10	1, 000	
		2, 100
Bank protection—		
Slope paving, 2,500 square yards, at $2.50	6, 250	
Heavy stone, 300 cubic yards, at $4	1, 200	
		7, 450
Temporary buildings		500
Lock keeper's house		3, 000
ool between Locks 1 and 2: Dredging 558,000 cubic yards, at 15 cents		83, 700
ock and Dam No. 2, with guide walls, bank protection, temporary buildings, and lock keeper's house:		
Same as Lock and Dam No. 1	$60, 900	
With the following added—		
Earth dam, 25,000 cubic yards, at 20 cents	5, 000	
Concrete, 200 cubic yards, at $10	2, 000	
		67, 900
oss Bluff to Leesburg Canal: Excavation, 448.500 cubic yards, at 15 cents		67, 275
nals to Leesburg from Lakes Griffin and Harris: Excavation, 173,400 cubic yards, at 20 cents		34, 680
ck No. 3, with guide walls, bank protection, temporary buildings, and lock keeper's house:		
Same as Lock No. 1	$45, 150	
With the following added—		
Concrete, 500 cubic yards, at $10	5, 000	
Excavation, 3,000 cubic yards, at 20 cents	600	
		50, 750
provement in Dead River: Excavation, 6,000 cubic yards, at 15 cents		900
provement in Lake Dora Canal:		
Clearing	1, 500	
Excavation, 120,600 cubic yards, at 15 cents	18, 090	
		19, 590
Total		535, 595
pervision and contingencies, about 15 per cent		70, 405
Grand total		616, 000

Maintenance, $12,000 per year.

Four-foot channel, 50 feet wide from mouth of Oklawaha River to Mount Dora.

Mouth of river to lower end of Kyle & Young Canal:		
Clearing reach of snags and hyacinths		$20,000
Dredging 352,600 cubic yards of material in easing bends, making cut-offs, and removing shoals, at 15 cents		52,890
Lock and Dam No. 1:		
Dam—		
Concrete, 1,000 cubic yards, at $10	$10,000	
Piling, 4,000 linear feet, at 40 cents	1,600	
Bridge	200	
Gates	800	
Cribwork and stone, 150 cubic yards, at $5	750	
Excavation, 1,600 cubic yards, at 50 cents	800	
Earth fill dam, 5,000 cubic yards, at 20 cents	1,000	
		15,150
Lock—		
Cofferdam, 500 linear feet, at $20	10,000	
Earth excavation, 5,000 cubic yards, at 50 cents	2,500	
Piling, 5,000 linear feet, at 40 cents	2,000	
Concrete, 1,500 cubic yards, at $10	15,000	
Gates	800	
Valve-maneuvering appliances, bolts, etc	800	
Flooring and miter sills, 40 M, at $40	1,600	
		32,700
Upper and lower guide walls—		
Excavation, 1,000 cubic yards, at 50 cents	500	
Piling, 1,500 linear feet, at 40 cents	600	
Concrete, 100 cubic yards, at $10	1,000	
		2,100
Bank protection—		
Slope paving, 2,500 square yards, at $2.50	6,250	
Heavy stone, 300 cubic yards, at $4	1,200	
		7,450
Temporary buildings		500
Lock-keeper's house		3,000
Pool between Locks 1 and 2: Dredging 286,500 cubic yards, at 15 cents		42,975
Lock and Dam No. 2, with guide walls, bank protection, temporary buildings and lock-keeper's house:		
Same as Lock and Dam No. 1	$60,900	
With the following added:		
Earth dam, 25,000 cubic yards, at 20 cents	5,000	
Concrete, 200 cubic yards, at $10	2,000	
		67,900
Moss Bluff to Leesburg Canal: Excavation, 139,600 cubic yards, at 15 cents		20,940
Canals to Leesburg from Lakes Griffin and Harris: Excavation, 106,000 cubic yards, at 20 cents		21,200
Lock No. 3, with guide walls, bank protection, temporary buildings, and lock-keeper's house:		
Same as Lock No. 1	$45,150	
With the following added:		
Concrete, 500 yards, at $10	5,000	
Excavation, 3,000 cubic yards, at 20 cents	600	
		50,750
Improvement in Lake Dora Canal:		
Clearing	1,500	
Excavation, 49,500 cubic yards, at 15 cents	7,425	
		8,925
Total		346,480
Supervision and contingencies, about 15 per cent		52,520
Grand total		399,000

Maintenance, $10,000 per year.

Six-foot channel 60 feet wide from mouth of Oklawaha River to Silver Springs Run and 4-foot channel 50 feet wide to Mount Dora.

Mouth of river to lower end of Kyle & Young Canal:		
Clearing reach of snags and hyacinths		$20,000
Dredging 579,000 cubic yards of material in easing bends, making cut-offs, and removing shoals, at 15 cents		86,850
Lock and Dam No. 1:		
Dam—		
Concrete, 1,000 cubic yards, at $10	$10,000	
Piling, 4,000 linear feet, at 40 cents	1,600	
Bridge	200	
Gates	800	
Cribwork and stone, 150 cubic yards, at $5	750	
Excavation, 1,600 cubic yards, at 50 cents	800	
Earth fill dam, 5,000 cubic yards, at 20 cents	1,000	
		15,150
Lock—		
Cofferdam, 500 linear feet, at $20	10,000	
Earth excavation, 5,000 cubic yards, at 50 cents	2,500	
Piling, 5,000 linear feet, at 40 cents	2,000	
Concrete, 1,500 cubic yards, at $10	15,000	
Gates	800	
Valve-maneuvering appliances, bolts, etc	800	
Flooring and miter sills, 40 M, at $40	1,600	
		32,700
Upper and lower guide walls—		
Excavation, 1,000 cubic yards, at 50 cents	500	
Piling, 1,500 linear feet, at 40 cents	600	
Concrete, 100 cubic yards, at $10	1,000	
		2,100
Bank protection—		
Slope paving, 2,500 square yards, at $2.50	6,250	
Heavy stone, 300 cubic yards, at $4	1,200	
		7,450
Temporary buildings		500
Lock-keeper's house		3,000
Pool between Locks 1 and 2: Dredging, 286,500 cubic yards, at 15 cents		42,975
Lock and Dam No. 2, with guide walls, bank protection, temporary buildings, and lock-keeper's house:		
Same as Lock and Dam No. 1	$60,900	
With the following added:		
Earth dam, 25,000 cubic yards, at 20 cents	5,000	
Concrete, 200 cubic yards, at $10	2,000	
		67,900
Moss Bluff to Leesburg Canal: Exacavation, 139,600 cubic yards, at 15 cents.		20,940
Canals to Leesburg from Lakes Griffin and Harris: Excavation, 106,000 cubic yards, at 20 cents		21,200
Lock No. 3, with guide walls, bank protection, temporary buildings, and lock-keeper's house:		
Same as Lock No. 1	$45,150	
With the following added:		
Concrete, 500 cubic yards, at $10	5,000	
Excavation, 3,000 cubic yards, at 20 cents	600	
		50,750
Improvement in Lake Dora Canal:		
Clearing	1,500	
Excavation, 49,500 cubic yards, at 15 cents	7,425	
		8,925
Total		380,440
Supervision and contingencies, about 15 per cent		57,560
Grand total		438,000

Maintenance, $10,000 per year.

16. *Maps.*—There are submitted herewith maps[1] of the Oklawaha River. Three of these maps show profiles showing proposed water surface of river and canalized portion of same. For map showing location of and soundings in Lakes Harris, Eustis, Dora, and Griffin, forming the headwaters of the Oklawaha River, reference is made to local map sheet No. 38, submitted with Trans-Florida Canal Board's report.

17. *Change in gradient of river.*—In the proposed plan of improvement of the river there will be 27 cut-offs and a number of bends eased off. The present length of the river from the mouth to Silver Springs Run is about 53 miles; the changed length would be about 51. The drop in water surface is 36.5. The present river gradient is 0.0001304; the proposed gradient 0.0001350, the difference being too little to affect the river discharge.

18. *Drainage.*—The question of land reclamation in connection with river improvement has been considered. Adjacent to the river between Moss Bluff and Starkes Ferry, a distance of about 8 miles, there is a flat prairie country that is overflowed at high water and at low water furnishes grazing land for stock. About 2,700 acres could be reclaimed from being overflowed at high water by a change in plan of improvement of river to a lock and dam at Moss Bluff, and lock and dam at Starkes Ferry, and an increase in excavation between Moss Bluff and Starkes Ferry. The increased cost of this plan would not be justified by value of land reclaimed. In the stretch of land between Silver Springs and the lower end of the Kyle and Young Canal, site of Lock and Dam No. 1, about 200 acres will be reclaimed by the plan suggested.

19. *Board's recommendation for estimate.*—In the indorsement of the Board of Engineers of April 2, 1912, it is recommended that the estimates should be based on channel width of 100 feet. The estimates are submitted on 50 feet and 60 feet widths, as it develops from the survey that the low-water discharge of the river will not permit a channel 100 feet wide, unless canalization of river from Silver Springs Run is resorted to, as the dams would have to be constructed across swamps approximately 1 mile wide and extensive excavations undertaken to reach this width of river. The natural width of river varying from 60 to 80 feet, the estimates would greatly exceed the value of the proposed improvements.

20. The Board of Engineers further directs a comparison of cost of the method of improvement proposed, with the cost of canal located as recommended by the Board of Engineers in charge of the surveys for trans-Florida canal. This board prepared estimates for a canal 100 feet wide and 10 feet deep, and selected a location parallel to river from its mouth to Eaton Creek, and across country from Eaton Creek to the Oklawaha River near Moss Bluff. This route was deemed more economical than the utilization of the river for the desired width and depth of channel. The comparative estimates for a canal 6 feet deep and 60 feet wide is in progress, and although not completed, show the lateral canal to require the construction of 5 locks and a million cubic yards more of excavation than in the proposed plan for utilization of river.

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[1] Index map printed only.

21. *Commercial statistics.*—The commerce of the towns of Leesburg, Eustis, Mount Dora, Tavares, Tangarine, and Lisbon amounts to about 110,000 tons. None of this is now shipped by water. The kaolin works at Richmond are said to ship 35 to 40 cars per day, possibly as much as 200,000 tons a year. None of this is now shipped by water. The city of Ocala, having a population of about 5,000, situated in a country rich in lime and phosphate deposits, and producing large quantities of farm and garden produce, is located about 5 miles from Silver Springs, the headwaters of Silver Springs Run, which now has a depth of 7 feet to the Oklawaha River. It is estimated that Ocala has a commerce of about 300,000 tons a year. Very little of this, practically none, is shipped by water at the present time, but a number of the more prominent business men in Ocala are very much interested in securing water transportation facilities for Ocala, and propose to put a line of boats in the Oklawaha and operate them even if they are operated for the time being at a considerable loss. They propose to operate self-propelling steel barges 85 to 90 feet long. The present commerce of the river amounts to about 100,000 tons, of which 75,000 are sawmill logs. The firm of Kyle & Young have recently reclaimed 4,000 acres of land along the river and are starting on extensive farming operations. The extent of their future shipments can not be approximated, but will be considerable. From the foregoing statement it will be seen that there are approximately 500,000 to 600,000 tons of freight, the transportation charges on which will be affected more or less by the improvement of the Oklawaha River. The present freight rates to Leesburg, Ocala and Sanford are given below. Sanford is on the St. Johns River at a greater distance from Jacksonville than Leesburg or Ocala, and has rail and water transportation to Jacksonville, and from Jacksonville to northern ports. Leesburg and Ocala have only rail transportation to Jacksonville, the Oklawaha River in its present condition being of no use.

Class of freight and rate to Jacksonville, Fla.

[Cents per 100 pounds.]

	First.	Second.	Third.	Fourth.	Fifth.	Sixth.
Leesburg	68	62	57	45	38	33
Ocala	62	58	50	41	35	30
Sanford	37	32	29	24	19	16

If, as a result of the improvement of the river there should be a general reduction of 15 cents per hundredweight in rail rates, approximately the existing difference between the Sanford and the Leesburg and Ocala rates on sixth-class goods, the total saving in freight would amount to $1,800,000. I do not believe that any such saving as this is probable, but I believe it would be conservative to estimate that a saving of 15 cents per hundredweight would result on 200,000 tons, making a total annual saving of $600,000 if a 6-foot channel were provided.

22. *Water power.*—A small amount of water power could be developed at the proposed dams at the lower end of the Kyle & Young

Canal and at Moss Bluff. The fall at these dams would be 7 feet 6 inches and 11 feet, respectively. The amount of water available is 124 cubic feet per second. I do not believe that any plan for the development of this power could be coordinated with a plan for the improvement of the river in the interest of navigation, in view of the very small amount of power that could be developed.

23. *Recommendations and conclusions.*—In view of the material saving that would probably be effected in freight charges, if the river were improved, the promising character of much of the territory that borders the lakes, and the swamp through which the river flows, and the fact that an improved waterway along this line would be a step toward a trans-Florida canal along the best route as recommended by a special Board of Engineer officers, I am of the opinion that the Oklawaha River is worthy of improvement to the extent of providing a 6-foot channel from its mouth to Mount Dora, subject to the following conditions:

First. That those interested in this improvement agree to protect the United States against all claims for damages on account of any land that may be flooded as a result of the improvement of the river, and furnish satisfactory bond to the Secretary of War guaranteeing this protection.

Second. That merchants and fruit and vegetable growers along the river organize a stock company and subscribe to the stock of the same, to build and operate a boat line on the river, agree to operate such a number of boats as will insure boat service at least twice a week between lake points and the St. Johns River during the months of December, January, February, and March, and furnish satisfactory bond to the United States guaranteeing the fulfillment of the terms of this agreement.

Appropriation for this work should be made as follows:

First year	$160,000
Second year	160,000
Third year	160,000
Fourth year	136,000

J. R. SLATTERY.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
February 7, 1913.

To the CHIEF OF ENGINEERS:

1. This is a report of a survey of the Oklawaha River to Lake Dora, Fla. Since I have received the report I have been in correspondence with the district officer to obtain the information which seemed to me to be necessary to complete the subject.

2. At my suggestion, the district officer has prepared an index map, which enables one to see at a glance the course of the river and the length covered by the improvement. He has also informed me that he used the same estimate of cost of locks in the case of a 4-foot canal that he did for a 6-foot canal and that it would be practicable, in the case of the 4-foot canal, to build locks which could be used without alteration with the larger canal. In other words, to pass from the 4-foot canal having a width of 50 feet to a 6-foot canal with a width of 60 feet, it would only be necessary to enlarge the canal trunk and nothing would have to be done to the locks. He has advised me also that the distance from the mouth of the Oklawaha River to the upper end of Lake Dora is 107 miles, and that the distance from the mouth of Silver Springs Run up to Silver Springs is 5.4 miles.

3. Now, if this route were improved so as to afford a 4-foot navigation, but with locks suitable to a 6-foot depth, the cost, according to the estimate, which appears to be reasonable and sufficient, would be $399,000, or a little less than $3,750 per mile. I do not think there is any kind of a freight-carrying route of equal capacity that could be built up into that country at this price.

4. If the improvement was made upon this plan, by the expenditure of $40,000 more it could be given a depth of 6 feet and a width of 60 feet up to Silver Springs Run, about 53 miles, the remaining distance being of the original dimensions. By the expenditure of $178,000 more the larger dimensions could be extended all the way through.

5. I think that an improvement of this character would pay, and I recommend that it be undertaken as soon as the pressure of more important work permits the money to be applied to it. As other important works are completed in Florida, it would be proper to take up this work, and it could be begun with a moderate expenditure, say of about $100,000 a year, or even $75,000 if the larger amount could not be spared, and by beginning at the lower end the work would be beneficial, the locks would extend pool navigation, and the improvement could be utilized as fast as it was finished.

6. I agree with the district officer to this extent, in saying that the improvement is worthy of being undertaken by the United States.

Dan C. Kingman,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey see p. 3.]

SUPPLEMENTAL REPORT ON OKLAWAHA RIVER, FLA.

War Department,
United States Engineer Office,
Jacksonville, Fla., May 17, 1913.

From: The district engineer officer.
To: The Chief of Engineers, United States Army.
Subject: Drainage in connection with improvement of Oklawaha River, Fla.

1. In compliance with department indorsement dated May 2, 1913, the following report is submitted on the drainage that might be effected in connection with the improvement of the Oklawaha River.

2. Two plans for the improvement of the river have been considered having specially in view the drainage of marsh lands. One of these plans, referred to hereafter as plan A, the only one considered prior to submitting the report on the survey of the Oklawaha River, contemplates—

(1) A dredged channel from Silver Springs Run to a point near the upper end of the Kyle & Young Canal, forming a pool with the water surface at 37.5, the present low-water elevation of the river at Silver Springs Run.

(2) A lock and dam near the head of the Kyle & Young Canal and a dredged channel above the same, forming a pool with the water surface at 45, the present low-water elevation of the water surface of the river at the site of the proposed dam.

(3) A lock and dam at Moss Bluff and a dredged channel above the same, forming a pool with the water surface at elevation 50.33, 2 feet above the present low-water elevation of the river at the site of the proposed dam.

(4) A lock and dam at Starkes Ferry, forming a pool with an elevation the same as that of Lake Griffin, i. e., 56.20 at low water and about 61 at high water, the present high-water elevation of the lake.

3. The other plan, referred to hereafter as plan B, contemplates the formation of pools with surface elevations and locks and dams, just as proposed in report on the survey of the Oklawaha.

4. Both plans contemplate altogether abandoning the present river channel in those portions of the river where the width of the marsh land is great enough to make its drainage worthy of consideration, and constructing a new channel near one edge of the marsh, using the material dredged to form a levee between the new channel of the river and the land to be drained.

5. There are submitted herewith white prints[1] of sheets 12, 14, 15, 16, and 24, of the map of the Oklawaha River. Sheet 24 shows (*a*) the arrangement of pools recommended in report, which is the arrangement on which is based the estimated increase in cost of securing 6 and 4 foot channels if the drainage of the land is attempted in conjunction with the improvement of the river, in accordance with plan B, outlined in paragraphs 3 and 4; (*b*) by red lines the arrangement of pools on which is based the estimated increase in cost of securing 6 and 4 foot channels if the drainage of the land is attempted in conjunction with the improvement of the river, in accordance with plan A, outlined in paragraphs 2 and 4. Sheets 12, 14, 15, and 16 show (*a*) the localities along the river where the width of the marsh land is considered to be great enough to make its drainage worthy of consideration in conjunction with the improvement of the river; (*b*) by red lines the proposed location, according to both plan A and plan B, of the improved channel and levees in order to drain these parcels of land.

6. The estimated increase in cost of improving the portion of the river between Starkes Ferry and Moss Bluff in accordance with these plans over the estimated cost of improving this portion of the river in accordance with plans submitted in report of survey is as follows:

For a channel 6 feet deep and 60 feet wide.

According to plan A:		According to plan B:	
Extra lock and dam	$50,000	Extra excavation, 143,000 cubic yards, at 15 cents	$21,450
Additional excavation, 750,000 cubic yards, at 15 cents	112,500		
Total	162,500	Total	21,450

For a channel 4 feet deep and 50 feet wide.

According to plan A:		According to plan B:	
Extra lock and dam	$50,000	Extra excavation, 113,000 cubic yards, at 15 cents	$16,950
Additional excavation, 600,000 cubic yards, at 15 cents	90,000		
Total	140,000	Total	16,950

The area of the land that would be reclaimed if levee were located as indicated would be about 2,200 acres. By constructing the levee and channel closer to the edge of the marsh, which could probably be done with reasonable safety, this acreage might be increased to about 2,700 acres.

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[1] Not printed.

7. The estimated increase in cost of improving the portion of the river between Moss Bluff and the lower end of the Kyle and Young Canal over the estimated cost of improving this stretch in accordance with plans in original report is as follows:

For a 6-foot channel.

According to plan A:		According to plan B:
Additional excavation, 480,000 cubic yards, at 15 cents	$72,000	Same as original plan; therefore, no increased cost.

For a 4-foot channel.

According to plan A:		According to plan B:
Additional excavation, 450,000 cubic yards, at 15 cents	$67,500	Same as original plan; therefore, no increased cost.

No additional land would be drained by following plan A, but the land now drained would be a little more secure against floods.

8. The estimated increase in cost of improving the portion of the river between Heather Island and Sharpes Ferry, according to either of these plans, over the estimated cost of improving this portion of the river in accordance with plan submitted in report of survey, is, plans A and B being the same, for this section, as follows:

For a 6-foot channel, 60 feet wide: Additional excavation, 116,000 cubic yards, at 15 cents	$17,400
For a 4-foot channel, 50 feet wide: Additional excavation, 96,000 cubic yards, at 15 cents	14,400

The area of land that could be reclaimed in this stretch of the river would amount to between 470 and 500 acres.

9. Plan A was devised with the idea that it was desirable, in a combined drainage and river improvement scheme, to keep the surface of the pools as low as possible, in order to reduce to a minimum the height of such levees as might be necessary, and the head of water to be borne by the levees, which would have to be built of material composed of sand, clay, and mud, containing a large quantity of decayed vegetable matter, often peatlike in character, concerning the stability of which, in levees, considerable doubt was felt, and in order to facilitate carrying off such run-off as would reach the drained areas from rains. It was thought that if the pools were thus lowered it might be possible to have openings of considerable width between the downstream ends of levees, and highland, as Messrs. Kyle & Young have done, through which local drainage could be discharged into the river. Further study, and also the experience of Messrs. Kyle & Young, indicates that while this arrangement would work very well during low stages of the river, much of the land, dry at low-water stage, would be flooded at high-water stage, even if levees held, by backwater from the stream below the reclaimed areas entering through the gap proposed to be left in the levees. It is, therefore, believed to be essential to continue levees until they meet the naturally highland below the areas to be drained, thus completely inclosing the same. If this is done, it is probable that pumping plants will be essential to handle local drainage. Further study of the behavior of the Kyle & Young levee leads me to believe that a levee of these

materials would be safe if the levee were given a proper section and protected by suitable bank protection at points where it diverts the stream from its original bed, notwithstanding the fact that the said levee has failed in one locality both times when it has been subjected to high water. This plan, therefore, not only involves greatly increased costs, but also would fail to accomplish any of the objects sought in devising it, except that of keeping down to a minimum the head of water to be withstood by the levee, and it would do this only during low stages. It is, therefore, not worthy of consideration, especially since the increased cost involved considerably exceeds what the owners of land that might be reclaimed would be willing to pay for such reclamation at the present time.

10. Plan B would involve levees having an average height of about 10 feet, which is no higher than would be involved in plan A. The increased cost of carrying out this plan, between Moss Bluff and Starkes Ferry, would be well within the limit of expenditures that the amount and character of the land that would be reclaimed would warrant being expended, but it is probably more than the owners would be willing to spend for that purpose at the present time, especially as this amount would not cover shaping the levees. The owners would not only have to contribute this amount, but would also have to go to the expense of shaping, compacting, and protecting the levees, and would also probably have to install a pumping plant in addition. As a rule, in this State, owners of marsh land are not willing to spend more than four or five dollars per acre in reclaiming land at the present time. If the question of improving the river were made to depend upon the contribution of the increased amounts necessary in order to carry out plan B, it is possible, even probable, that the owners of property that would be reclaimed might contribute this amount, but I do not believe any amount in excess of this could possibly be obtained.

11. The additional expenditure involved in carrying out plan B, between Heather Island and Sharpes Ferry, would not be warranted by the amount of land that could be reclaimed at the present time. Furthermore, this land being swamp land as distinguished from marsh land is very much less valuable for agricultural purposes than the land between Starkes Ferry and Moss Bluff.

12. A short distance below Sharpes Ferry the river enters a cypress swamp which extends along the course of the river to the St. Johns River. There are areas in this swamp that could be reclaimed by changing the course of the river and constructing levees, but no consideration has been given to these areas, because of the facts:

(1) That there will be no demand for draining these lands until the cypress timber has been removed.

(2) That it is almost certain that the cost of improving the river in the interest of navigation would be considerably increased by coordinating drainage and channel improvements.

13. It is therefore not possible, in my opinion, to so coordinate the drainage of lands along this river with the improvement of the river in the interest of navigation as to lessen the cost of such improvements (in the interest of navigation) and compensate the Government for expenditures made in the interest of navigation.

J. R. SLATTERY,
Major, Corps of Engineers.

LETTER OF HON. D. U. FLETCHER.

United States Senate, *March 26, 1913.*

Gentlemen: In connection with your notice of March 11 regarding Maj. Slattery's report on the "Oklawaha River to Lake Dora," I would like to ask that you set a date for a hearing and arguments in this matter after April 7. I regard this as one of the most important improvements to be considered in Florida.

I believe it would be a great mistake, and little short of a calamity, to have Maj. Slattery's report disapproved and this improvement denied. I wish to be heard on it and to submit the views of others. In Florida there are extensive possibilities in the way of developing systems of water transportation and the Oklawaha River is one link in such a system. The development of this waterway would affect a material reduction in the cost of shipping produce from Leesburg, Ocala, Ocala centers and greatly facilitate the development of that country. The 6-foot channel should be favored notwithstanding its increased cost, because a more shallow waterway would not permit sufficiently rapid transportation to enable boats to compete with railroads, especially where the character of freight to be handled is as perishable as the produce of Florida. At least the usefulness of a more shallow waterway would be open to question as to whether the benefits exceed the cost, whereas as to a 6-foot channel there could be no such question. Messrs. Kyle and Young, I know, and there are others ready to undertake such developments, are, at enormous expense to themselves, opening up for cultivation areas of rich lands bordering on the Oklawaha. About the only means of transportation available to them is this waterway. There are thousands of acres of fertile prairie lands in the valley of the Oklawaha and also timbered land adjacent to the river in the northern portion. The great railroad builders of this country did not wait for the country to actually develop before they built railroads. The country has developed along such railroads and the railroads have done good business even where there were but very meager prospects. I believe the waterways should be constructed in advance of actual development just as so many of the railroads have been. I think the Government in improving waterways should have in mind comprehensive systems of waterways capable of serving properly large territories. Such an improvement as this has many advantages over purely local improvements, because the benefits would extend throughout the length of the river and adjacent territory. Our waterways will never serve their full usefulness until we undertake their improvement on a larger scale, with the view of providing complete systems of waterways capable of permitting certain and rapid transportation by boat.

I sincerely hope the board will assume a more liberal attitude toward the improvement of the Oklawaha River and also toward the larger improvement of the intracoastal canals generally.

Very respectfully,

Duncan U. Fletcher,
United States Senator.

The Board of Engineers for Rivers and Harbors.

LETTER OF MR. J. D. YOUNG.

Washington, D. C., *April 1, 1912.*

Gentlemen: I wish to submit a few facts relating to the Oklawaha River, Fla., in support of the necessity of the improvement of said river by the National Government. As I understand it, it is not the intention of the committee to attempt to have the board reverse itself but rather put facts and figures before this board that will enable it to act on good judgment and at the same time recommend to Congress the necessity of this improvement.

I shall first in a layman's way outline the extent of work needed to be done on this river. The distance from the Silver Springs Run to the lakes, which embraces the territory familiar to myself, and to which I shall confine my argument, would be by way of straightening and improving the river that occurs to me as needful, approximately 25 miles, the most part of which distance would be a comparatively easy improvement, and if done with the double view, to wit, navigation and reclamation, could at a comparatively small cost be made navigable to whatever extent this board might deem wise for the Government to undertake. This navigation could be made as nearly perfect to this extent by the use of two locks and the utilization of the magnificent system of lakes which embraces upward of 200 square miles of territory as a reservoir.

This would put in absolute control the water of that entire section, whereby sudden rises causing damaging overflow to agriculture would be prevented.

The reclamation along the river would consist if properly handled in the complete reclamation of no less than 15,000 acres of the most valuable humus or muck lands in the State of Florida and to my mind the most valuable in the whole country, the nature of which has been thoroughly demonstrated by the reclamaton in what is known as Heather Island Prairie of something like 5,000 acres upon which there are now growing crops with a prospect of a record-breaking yield in both grain and vegetables. The value of these lands has been passed on by such eminent experts as Prof. Rolfs of the United States Agriculture Department and many of the best agriculturists in the State of Florida as being without an equal in fertility. The system of improvement could embrace irrigation as well as drainage and could also develop considerable horsepower at each of the locks that would be immediately available in the cultivation of said land.

As to the question of commerce, I make the following deduction from the facts at hand. With proper cultivation, the reclaimed lands would supply a commerce that would depend wholly on the river for an outlet of no less than 3,000 carloads of farm produce per annum, or about 10 carloads for each working day during the year, and with the probable intensive methods that would soon be inaugurated, the yield would in all probability reach double this amount.

There is no less than 300,000 acres of virgin pine lands east of the Oklawaha River which is entirely shut off from railroad communication and which is dependent absolutely upon the opening of this river for an outlet for more than 800,000,000 feet of choice lumber, which the markets of the world are demanding and which now lies at the mercy of forest fires and is fast being destroyed by same, and unless given this relief in the near future will be a total loss to the world. In addition to this, the present farming industry of that section of the country would receive such new life as to cause it to develop to an inestimable degree, and in this way largely add to the upbuilding of this section of the country and the commerce of the river.

This carries us into what is known as the lake region, consisting of numerous beautiful lakes that are surrounded by thousands of acres of the most desirable fruit lands, many of which now contain large groves and merely await this outlet for bringing this development to the very highest degree. The borders of these lakes would, in case of such advantages, develop to such an extent that within a few years after having been given this outlet would be the banner garden spot of the entire country, supplying the much needed fruits and vegetables to the world, whereby the needy, as well as the millionaire, would be supplied with choice fruits and vegetables at all seasons of the year at a price within the reach of all.

Another feature, which I have been cautioned by some interested friends not to advance as an argument to this honorable board, but, believing as I do that it is an injustice to this board to suppose that it would fail to give each improvement to the country due consideration in each connection with this work, I therefore beg to call attention to the improvements that would naturally come to these lakes in the way of building of fine homes and developing a section of the country that would be the pride of all Florida, and in this way develop a magnificent passenger traffic along this canal and throughout all these lakes, whose borders embrace some 200 to 300 miles of territory.

Now, as to the extent of improvement, and for the cost of same, the board of engineers do not need the opinion of a layman. But I beg to submit that the expenses would be an insignificant item as compared with the development that would be occasioned by same. I feel justified in stating this far, however, that the present needs of this community would be met by this development to the extent of a 30 to 40 feet in width canal with a depth of not less than 6 feet of water. This can be accomplished between Silver Springs and Lake Griffin by the expenditure of not more than $250,000.

This could be enlarged as the needs might arise in the future at a comparatively small cost. If, however, this board would feel justified in making an improvement of much greater extent the people of this section of the country will in that event be doubly thankful. Knowing the certain results in large developments by this expenditure, which is to this Government a trifling amount, I believe I am justified in asking that this board reconsider their former conclusion and in believing that they will grant the improvement to such an extent as their judgment would suggest as needful.

Respectfully submitted.

Yours, very truly,

J. D. YOUNG.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MR. J. D. YOUNG.

WASHINGTON, D. C., *April 5, 1913.*

GENTLEMEN: In reference to the suggested improvement, for the joint purposes of navigation and reclamation on the Oklawaha River, Fla., I beg to say if a successful plan of drainage was coupled with the features of navigation, whereby the large tracts of muck prairies, north of Lake Griffin, were made available for agricultural purposes, I think a just pro rata part of cost for the land owners in this section to pay would be $10 per acre for all lands thus successfully drained—that is to say, where the flood or overflows from the river is kept off of those lands, the land owner, of course, to take care of all surface drainage by lateral ditches, according to his own notions.

As to the question of plans for the successful drainage of these lands, I would prefer not to offer my layman opinion. I am positive, however, from my knowledge of the situation, that a most successful reclamation can be embodied with the feature of navigation, and as owner of considerable of these lands I would be willing to pay the amount named above.

Considering the extent of the work provided for in Maj. Slattery's recommendations, namely, 60 feet of width, with a depth of 6 feet, which includes the entire distance from the St. John's, at Welacka, into Lake Griffin, I think his estimated cost a most conservative one.

In view of the large agricultural interests already developed at the headwaters of this stream, together with the large benefits to be derived from the reclamation feature, I consider this one of the most worthy projects now before your board from the State of Florida, and I know of no point where such an expenditure will result in greater good to so large an area of country.

I trust that this board can feel that they are justified in making the necessary recommendations for this improvement.

Most respectfully submitted.

J. D. YOUNG.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE LEESBURG BOARD OF TRADE.

LEESBURG, FLA., *April 10, 1913.*

At a special meeting of the Leesburg Board of Trade held on the above date the following resolution was unanimously adopted:

Whereas Maj. J. R. Slattery, of the United States engineer's office, district of Florida, has recommended to the Board of Engineers at Washington the improvement of the Oklawaha River, giving a 6-foot channel, 60 feet wide, from the mouth of said river to Lake Dora; and

Whereas we believe a channel of such dimensions is necessary to take care of the traffic that would be offered a boat line upon the river: Therefore be it

Resolved, That the members of the Leesburg Board of Trade, individually and collectively, do most heartily, earnestly, and enthusiastically indorse and uphold the recommendation as made by Maj. Slattery; and be it further

Resolved, That a copy of these resolutions be handed the committee from the Board of Engineers from Washington on their visit to Leesburg with a few of the reasons such channel is desired and demanded appended."

J. CHESTER LEE, *President.*

Attest:
A. B. LEES, *Secretary.*

APPENDED REASONS.

First. The opening of the Oklawaha River would mean a great reduction of freight ates. As an instance we give below comparative rates between Jacksonville and Leesburg, without water transportation, and Jacksonville and Sanford, with water ransportation:

Class.	Leesburg.	Sanford.	Class.	Leesburg.	Sanford.
First	68	37	Fourth	45	24
econd	62	32	Fifth	38	19
Third	57	29	Sixth	33	16

It is estimated that nearly, if not more than, 600,000 boxes of citrus fruits have been shipped from this section the past season. By shipping by water a saving could be had to the growers of something like 7 cents per box, or $42,000 on citrus fruits alone. The combined parcels of vegetables will doubtless exceed the packages of fruits shipped from this section, hence a like saving on this produce.

The freight coming into this section would be reduced accordingly, and would mean more in the aggregate saved than the figure given on citrus fruits.

Second. Not only are the shippers exorbitantly taxed for freights, but often they are made to suffer for the want of freight cars, the railroads during the rush season being unable to furnish them in sufficient quantities.

Third. Points on the lakes and along the river not having railroad facilities are sorely in need of relief. Emeralda, situated at the mouth of the river, is 10 miles from Leesburg, to which point the shippers are compelled to send their produce over a line operated by the Atlantic Coast Line Railroad, paying an exorbitant rate. These points can not develop, as the character of their lands warrant, without relief.

Fourth. Thousands of acres of undeveloped lands are lying idle close to the lake shores. These lands are fertile, and only need cheap transportation to insure their development.

Fifth. Millions of tons of kaolin deposits lie around the shores of Lakes Harris and Griffin. Two plants are already in operation near Yalaha, but are considerably handicapped on account of high freight rates. Water transportation would probably develop factories at these points for the manufacture of chinaware.

Sixth. Coal for factories could be brought into this territory at a reasonable rate, thereby encouraging the establishment of factories for a varied number of enterprises, the material for which is at hand.

Seventh. With thousands of dollars saved annually by shippers and consumers, these same shippers would be better able to increase their output, adopt more modern methods and machinery, and otherwise develop and extend their fields of labor. It would mean comfort and happiness, better houses, and better education for their children.

Eighth. The opening of the river to the extent recommended would eventually mean a great saving to the Government in the event the cross-Florida ship canal is built, and would afford cheaper transportation to the base of operations for machinery, etc.

Ninth. Hay raising, stock raising, dairying, canning factories, etc., are beginning to claim the attention of our people. With reasonable freight rates these industries would be greatly encouraged, and could be operated at a profit.

Tenth. Finally, this section of Florida is now progressing, new settlers are coming in and making developments and improvements, new enterprises are in process of building, but we are burdened. We need relief; and when afforded, our fertile, healthful, and beautiful section will develop and send thousands of tons of produce down the Oklawaha River to all points on the globe, affording profits to a boat line of several ships.

Respectfully submitted.

LEESBURG BOARD OF TRADE.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE OCALA BOARD OF TRADE.

OCALA, FLA., *April 11, 1913.*

DEAR SIR: The following action was taken by the board of governors at its special meeting on April 10:

"*Resolved,* That the Ocala Board of Trade is in sympathy with the Leesburg Board in reference to the improvement of the Oklawaha River, and heartily indorses Maj. Slattery's report for a channel 60 by 6 feet, and will do all possible to further this project."

Yours, truly,

J. D. ROONEY, *Secretary.*

Mr. L. E. DOZIER,
Chairman Special Committee, Leesburg, Fla.

LETTER OF THE MARTIN MARBLE CO.

LEESBURG, FLA., *April 12, 1913.*

DEAR SIR: We hand you herewith compilation of volume of business, not including passenger traffic, of the transportation lines and companies of Leesburg. The time allotted for the finishing of this work was too short for us to get an itemized compilation and report, but we have given it the best possible attention under the existing circumstances.

We desire to call your attention to the fact that a very large per cent of the commodities making up this revenue and tonnage shown is of that nature that would naturally go via water transportation were there in operation a regular water schedule and rate. The water rate would also justify a great deal more business from this section in kaolin, wood, timber, moss, and other natural products.

Respectfully submitted.

COMMITTEE.

MR. A. B. LEES,
Secretary Leesburg Board Trade, Leesburg, Fla.

Volume of business of the Seaboard Ry. freight department, at Leesburg, Fla., for the past 6 months.

	Tonnage.	Revenue.		Tonnage.	Revenue.
1912.			1913.		
October:			January:		
Received	1,742,123	$1,654.46	Received	2,220,508	$2,244.97
Forwarded	2,588,110	4,316.47	Forwarded	1,616,279	3,878.48
November:			February:		
Received	2,194,122	1,735.33	Received	1,677,577	1,160.51
Forwarded	1,545,828	2,986.50	Forwarded	1,177,045	3,508.30
December:			March:		
Received	9,750,512	2,474.43	Received	1,138,684	1,563.41
Forwarded	1,033,248	3,663.01	Forwarded	638,026	1,454.02
			Total	27,422,062	30,639.92

Boxes of oranges forwarded	69,096
Cars melons forwarded	184
Tonnage from Eldorado from September, 1912, to Apr. 1, 1913:	
Received	2,114,588
Forwarded	1,113,892

Volume of business of the Atlantic Coast Line Ry. freight department, at Leesburg, Fla., for the past 6 months.

	Tons.	Revenue.		Tons.	Revenue.
1912.			1913.		
October:			January:		
Received	900,472	$2,066.23	Received	2,281,163	$2,757.08
Forwarded	4,290,542	2,885.90	Forwarded	3,690,912	11,163.70
November:			February:		
Received	2,679,717	2,693.06	Received	4,312,629	2,420.25
Forwarded	4,290.542	18,984.80	Forwarded	2,885,371	3,767.17
December:			March:		
Received	3,177,163	2,794.21	Received	2,503,565	1,978.96
Forwarded	4,170,674	13,279.72	Forwarded	1,555,221	5,664.35
			Total	36,757,971	71,956.33

Boxes of oranges forwarded	75,760
Cars melons forwarded	35

Volume of business of the Southern Express Co., Leesburg, Fla., for the past seven months, beginning September, 1912.

	Received.	Forwarded.		Received.	Forwarded.
1912.	*Tons.*	*Tons.*	1913.	*Tons.*	*Tons.*
September	14,897	5,578	January	22,777	135,555
October	20,759	14,427	February	24,452	201,166
November	29,006	52,376	March	21,709	38,641
December	38,057	222,848	Total	169,657	670,591

Total forwarded and received	840,248

RECAPITULATION.

Total tonnage (in pounds) of the two railways, Atlantic Coast Line and Seaboard	64,180,033
Lake Griffin Navigation Co	840,248
Southern Express Co	5,936,000
Eldorado (belonging to Leesburg business)	3,228,480
Total tonnage (in pounds)	74,184,761

Equal to over 3,091 solid carloads.

Total number of boxes oranges shipped over the two railroads (freight only)	144,856
Number cars of melons over both roads	219
Total revenue, freight departments only, both roads	$102,596.25

LETTER OF THE EUSTIS BOARD OF TRADE.

EUSTIS, FLA., *April 13, 1913.*

GENTLEMEN: I am honored on this occasion by the Eustis Board of Trade to present to the Board of United States Engineers the following information kindly collected and furnished by Mr. C. E. Woods, editor of the Lake Region, for this occasion, and we hope that such a creditable statement of facts and figures will warrant our asking for, and the granting of the expenditure of the sum estimated necessary by Maj. Slattery in his report to the Chief of Engineers, to deepen and widen the Oklawaha River. We feel that we can show from the statistics herein compiled that the commerce of the section of country adjacent to the Oklawaha River and its tributaries, comprising our beautiful lakes, Eustis, Harris, Dora, Griffin, Yale, Beauclair, and Apopka, will justify the appropriation. We also feel that the freight rates on all commodities into or out of this region are unneccessarily high and we believe that our only relief lies in cheaper water transporation made possible by opening up navigation through the Oklawaha River to light-draft vessels. Mr. Woods informs us that the passenger business for last year from Eustis averaged $2,500 per month. The outgoing freight earnings for the same time averaged $6,000. The incoming freight earnings averaged $2,500 per month, and it will be seen that the incoming freight is very much greater in volume than our outgoing freight, yet it does not nearly represent in value our outgoing freight, the latter being in carload lots, shipped to New York, Boston, Philadelphia, to the State of Texas, and, in fact, to all parts of the United States, cars largely consisting of melons, citrus fruits, and vegetables.

	Cars.
Last year's shipment of watermelons	71
Last year's shipment of citrus fruits	109
Total for the year (1912)	180

Shipments of miscellaneous products approximated one-half a car per day, about 26 cars, making a total of 206 cars for the year. The average collections on the same being from $6,000 to $7,000 per month.

The incoming freight of all kinds averaged four cars daily, the year round, about 1,460 per year, the collections on the same amounting to $2,500, as previously stated, per month.

Mr. Woods states also that the following increases occurred in the local passenger business:

January, 1913, increased over January, 1912	$4,700
February, 1913, increased over February, 1912	4,800
March, 1913, increased over March, 1912	8,000

The last-named month's earnings were over $8,000 above any other month's earnings in local history. Of course no credit is given this station for round-trip tickets sold elsewhere to Eustis, which business probably reaches $20,000 during the tourist season.

As a financial proposition we may deduce this from the facts presented that the Eustis station earns on—

Incoming freight	$30,000
Outgoing freight	72,000
Passenger business	30,000
Round trips to Eustis, not credited to local office	20,000
Total	152,000

Or an average of about $3,000 per week.

I have learned through the managers of the packing houses in Eustis that the shipnents of oranges and grapefruit were as follows:

	Boxes.
Eustis packing house	35,575
Gould packing house	27,000
Outside shipments probably	10,000
Total	72,575

Orange groves:	Acres.
Eustis	530
Grand Island	350
Umatilla	650
Total	1,530

Very respectfully submitted.

Philip Prioleau.

The Board of Engineers for Rivers and Harbors.

LETTER OF THE LEESBURG BOARD OF TRADE.

Leesburg Board of Trade,
Leesburg, Fla., May 10, 1913.

Dear Sir: I take pleasure in inclosing herewith additional data from points ibutary to the Oklawaha River project. Owing to limited time, and other difficulties xperienced in obtaining access to the railroad company's records, we are unable to esent an itemized statement, or as full and complete report as we should like. Some ents of the railroads refused us data of any description. However, we feel that even th this limited information your board will realize, to some extent, the vast reurces still undeveloped, as well as the commerce now tributary to this important oject.

I beg to remain, very respectfully,

A. B. Lees, *Secretary.*

The Board of Engineers for Rivers and Harbors.

LETTER OF THE TAVARES BOARD OF TRADE.

Tavares Board of Trade,
Lake County, Fla., May 9, 1913.

Dear Sir. I beg to hand you the amount of freight received and forwarded by the aboard Air Line from this place for the 12 months beginning May 1, 1912, and ending ril 30, 1913.

Tonnage received, 15,182,697 pounds. Tonnage forwarded, 23,582,204 pounds.

The amount received and forwarded by the Tavares and Gulf during the same period of time from Tavares is as follows:

Tonnage received, 10,121,800 pounds. Tonnage forwarded, 15,721,460 pounds.

I can only give the figures for the Atlantic Coast Line Railroad for the first three months of this year, viz, January, February and March, 1913, which is as follows: Received for incoming freight, $2,642.44, and for outgoing freight, $22,553.72.

I am sorry that I am unable to give you the figures in the way you requested, but the Atlantic Coast Line agent refused to let us have the information and the Seaboard agent refused to give it other than as given above. I did not see the agents myself but the above is as reported to me by those who did see them.

With kindest personal regards, I beg to remain,

Yours, very truly,

TAVARES BOARD OF TRADE,
By E. M. TALLY,
Secretary and Treasurer.

Mr. W. L. MARTIN, *Leesburg, Fla.*

LETTER OF MR. W. L. MARTIN.

MAY 10, 1913.

DEAR SIR: You will find herewith attached additional data gathered from the railroad stations tributary to the proposed Oklawaha River Canal. This report shows the volume of business for a period of one year—May, 1912, to May, 1913. It is not "estimated," but actual business as shown by the records in the various offices and compiled by your committee personally.

Respectfully submitted.

W. L. MARTIN, *Committee.*

Mr. A. B. LEES,
Secretary Leesburg Board of Trade, Leesburg, Fla.

SUMMARY.

Tonnage:	Tons.	Revenue:	
Apopka	13, 200	Apopka	$28, 200
Zellwood	2, 750	Zellwood	14, 400
Umatilla	15, 000	Umatilla	50, 000
Sorrento	12, 000	Sorrento	30, 000
Lady Lake	3, 000	Lady Lake	5, 000
Lisbon	4, 200	Lisbon	18, 000
Grand Island	2, 200	Grand Island	10, 000
Okahumpka	3, 000	Okahumpka	10, 500
Total	55, 350	Total	166, 100

Total cars melons shipped		482
Total cars oranges shipped		599
Apopka (two railroads):		
Freight forwarded and received	tons	13, 200
Earnings on above		$28, 200
Oranges, solid cars	cars	60
Oranges, local shipments	boxes	2, 500
Zellwood (one railroad):		
Freight forwarded and received	tons	2, 750
Earnings on above		$14, 400
Oranges, solid cars	cars	32
Packages freight forwarded	packages	20, 000
Umatilla (one railroad):		
Freight forwarded and received	tons	15, 000
Earnings on above		$50, 000
Oranges, solid carloads	cars	290
Oranges, total number boxes	boxes	117, 758
Melons, solid cars	cars	136
Naval stores	do	36
Wood	do	100
Ties	do	1, 000
Lumber	do	1, 200

Business increasing from $3,000 to $9,000 per month.

Sorrento (one railroad):		
Freight forwarded and received	tons..	12,000
Earnings on above		$30,000
Oranges, solid cars	cars..	60
Oranges, number packages	packages..	18,240
Melons, number cars	cars..	93
Lumber, number cars	do....	1,200
Lady Lake (one railroad):		
Freight forwarded and received	tons..	3,000
Earnings on above		$5,000
Oranges, solid cars	cars..	30
Oranges, local packages	boxes..	5,795
Melons, number cars	cars..	150
Wood, number cars	do....	40
Lisbon (one railroad):		
Freight forwarded and received	tons..	4,200
Earnings on above		$18,000
Oranges, solid cars	cars..	57
Oranges, local packages	boxes..	9,000
Naval stores, cars	cars..	50
Wood, solid cars	do....	25
Melons, solid cars	do....	48
Grand Island (one railroad):		
Freight forwarded and received	tons..	2,200
Earnings on above		$10,000
Oranges, solid cars	cars..	45
Oranges, total number packages	boxes.	15,000
Melons	cars..	40
Okahumpka (one railroad):		
Freight forwarded and received	tons..	3,000
Earnings on above		$10,500
Oranges, solid cars	cars..	25
Melons	do....	15

LETTER OF THE CITY OF LEESBURG, FLA.

LEESBURG, FLA., *September 5, 1913.*

GENTLEMEN: At a special meeting of the city council held on even date the following resolution was unanimously adopted:

Whereas there is at this time a project under consideration by the Board of Engineers for Rivers and Harbors for the construction of a canal, or the deepening and widening of the Ocklawaha River, opening up the connections between the lakes of Lake County, Fla., and the St. Johns River:

Be it resolved by the City Council of the city of Leesburg. That so soon as the said project is carried to a practical conclusion and the said river and connections are in operation and open to navigation, the city council of the city of Leesburg binds itself and its successors in office to furnish sufficient land on the city canals on Lakes Harris and Griffin, or on both of said canals, for the purpose of establishing public wharves and docks; to provide and maintain suitable approaches to said wharves and docks so that the public shall have easy and permanent access to the same; to establish wharfage and dockage rates and regulate the same so that they shall be uniform and equal to all, but subject to such orders and final regulations as may from time to time be issued from the proper department at Washington.

Very respectfully,

W. H. HOWELL,
President City Council.

Attest:

L. M. JOHNSON, *Clerk.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

RESOLUTION OF THE TAVARES BOARD OF TRADE.

At a meeting of the Tavares Board of Trade, April 11, 1913, the following resolution was passed:

Whereas it has come to the attention of this board that a canal 30 feet wide has been suggested as a sufficient waterway for this section of the country,

Resolved, That this board earnestly protest against an insufficient canal, and urge that a canal 60 feet wide and 6 feet in depth be approved by the engineers having such work in hand, for the reason it has been scientifically determined that a width of 60 feet is necessary for boats of 20 feet in width, the same as recommended by Maj. Slattery of the United States Board of Engineers.

That such a boat and waterway is necessary is judged from the following facts: The canal entering Lake County from the Ocklawaha River, connecting the four large navigable lakes of this section must meet the demands not only of the lands adjacent to the proposed canal but must be sufficient to transport the products of lands surrounding these lakes. The perimeter of these lakes is not less than 125 miles; therefore is equivalent to the territory feeding a canal 125 miles longer than that proposed leading into Lake Dora. This does not include the large lake of Apopka, with its tens of thousands of acres of muck land awaiting development; nor the beautiful lakes of Minneola, Minnehaha, and Lake Louise.

Along this 125 miles will be at least a two-mile back contributing area, which will be equal to 160,000 acres, which if planted to citrus fruits, at two boxes only to the tree, will give 19,200,000 boxes, which would require 64,000 cars for their transportation, at $183 a car to New York (61 cents a box, 360 boxes), which would amount to the sum of $11,712,000. This is an estimate to give an idea of the enormous freightage possible to this section.

We call attention to the 14 turpentine stills and the 8 sawmills that are now in operation in Lake County, and the $150,000 kaolin plant on the south side of Lake Harris, the Coatling infusorial earth plant, proposing to ship 100,000 tons a year, the American Diatomite Co., and the American Land & Mining Co., all corporations having large areas of infusorial earth, all of which lumber, turpentine, and earth products require water transportation.

It has been demonstrated that said 160,000 acres can produce more than a ton of Natal grass per acre.

The lower rates this waterway will give us will many times multiply the organizations now at work. Our wild lands, all of them, three years ago sold from $3 to $5 per acre. The same are now selling for $25 to $100 per acre in this lake region.

The Citrus Exchange, operating at Tavares, one of the best equipped plants in the State, when this season is over will have shipped over 100,000 boxes of fruit. The territory tributary to this shipping point raises 125,000 boxes of fruit not shipped through said exchange.

The Lake County Manufacturing Co., located at Tavares, is now shipping 125,000 feet of lumber per month and 12 to 20 cars of wood per month, and receive 2 cars of freight per month. The same company is preparing to convert the stumps from their large territory into naval stores and wood pulp. The Tavares turpentine plant ships and receives 24 cars per year.

The Atlantic Coast Line Railroad Co. for January, February, and March, 1913, received for incoming freight $2,642.44 and during the same time for outgoing freight $22,553.72.

The Seaboard Air Line Railway has received for incoming freight during the same three months $1,281.88 and for outgoing freight $15,789.62.

The Tavares & Gulf Railroad for the same time received for incoming freight $7,573.89 and for forwarding or outgoing freight $1,801.46. The fruit, vegetables, and naval stores handled into Tavares by the Tavares & Gulf Railroad for the year ending June 30, 1912, were as follows:

Oranges	boxes	94,221
Lettuce	hampers	21,764
Cabbage	crates	795
Naval stores	barrels	4,679
Cucumbers	hampers	24,347
Squash	crates	776
Potatoes	barrels	1,479
Tomatoes	crates	8,568
Watermelons	cars	82

The freight rates from Tavares to Jacksonville are as follows:

First-class	per 100 pounds	$0.70
Second-class	do	.63
Third-class	do	.59
D class	do	.16
Fertilizer	per ton	2.10

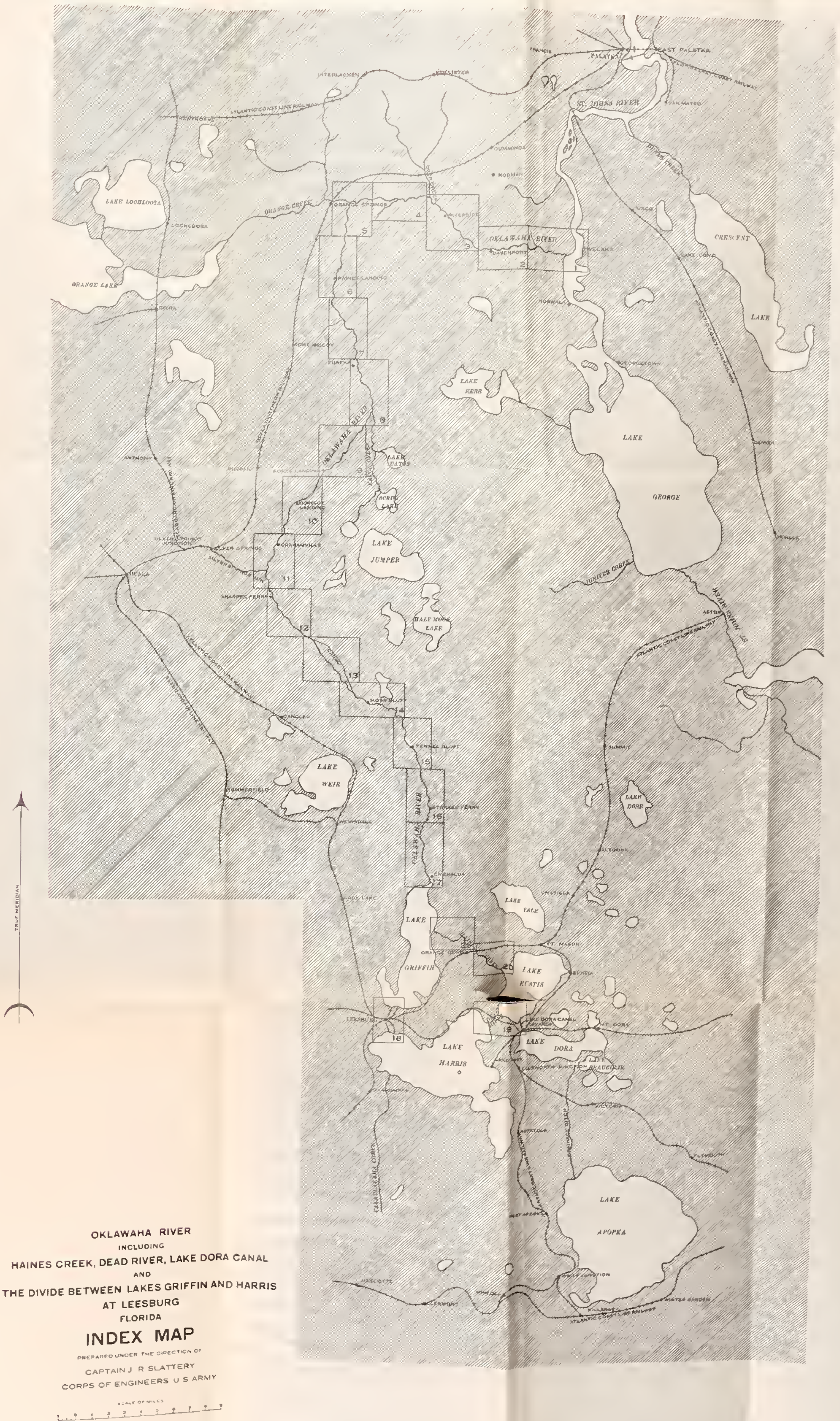
The above rates should be compared with the Sanford water rates, which will be approximately our water rates with the canal, to show the savings in freight to the people of Tavares alone.

The United States has an asset in Lake County that should be worked for the benefit of her population, for whom homes must be found by Tavares Board of Trade.

W. G. Long, *President.*
E. M. Tally, *Secretary.*

WAR DEPARTMENT

CORPS OF ENGINEERS U. S. ARMY



OKLAWAHA RIVER
INCLUDING
HAINES CREEK, DEAD RIVER, LAKE DORA CANAL
AND
THE DIVIDE BETWEEN LAKES GRIFFIN AND HARRIS
AT LEESBURG
FLORIDA

INDEX MAP

PREPARED UNDER THE DIRECTION OF
CAPTAIN J R SLATTERY
CORPS OF ENGINEERS U S ARMY

SCALE OF MILES
1 0 1 2 3 4 5 6 7 8 9

TO ACCOMPANY REPORT OF JANUARY 21 1913

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